

that this Admiralty system of training has produced the majority of the men who are now occupying the leading positions in the shipbuilding industry of this country; that it has given to the private shipbuilders its leaders, who have risen from the working classes; and that it has produced many men holding responsible positions in other parts of the world.

SOCIETIES AND ACADEMIES.

LONDON.

Chemical Society, November 18.—Dr. W. A. Tilden, F.R.S., president, in the chair.—The union of carbon monoxide and oxygen, and the drying of gases by cooling, by Mr. A. F. Girvan. A series of experiments with various cooling agents was made, to determine whether aqueous vapour could be so far removed from mixtures of these two gases by cooling that they could no longer be exploded electrically. It was found that after having been cooled to a temperature of -35° the mixture exploded feebly, and that if it had been cooled to below -50° explosion did not occur; whence it appears that there must be at least one molecule of water in 24,000 molecules of the mixture in order that such mixtures may explode.—Simplification of Zeisel's method of methoxyl and ethoxyl determinations, by Dr. W. H. Perkin, sen., F.R.S. The vertical condenser and washing bulbs are dispensed with, it having been found that the hydriodic acid is completely retained by using a long-necked distilling flask with its side arm arranged to slope slightly upwards.—The rusting of iron, part ii., by Dr. G. T. Moody. The salts which inhibit the formation of "rust" on iron are divisible into two classes, viz. those which are strongly alkaline, and therefore absorb carbon dioxide, e.g. sodium phosphate and borate, and those which are decomposed by carbon dioxide, e.g. sodium nitrite, acetate, and formate. The author is of opinion that the non-formation of "rust" in presence of these salts is due, therefore, to their removal of carbon dioxide from the air, and not, as was suggested by Dunstan, to their property of destroying hydrogen peroxide.—Constitution of ethyl cyanoacetate. Condensation of ethyl cyanoacetate with its sodium derivative, by Messrs. F. G. P. Remfry and J. F. Thorpe.—The action of water and dilute caustic soda solutions on crystalline and amorphous arsenic, by Mr. W. T. Cooke. Amorphous arsenic is dissolved to a minute extent only, by prolonged ebullition of the element in water or aqueous solutions of sodium hydroxide even in presence of air. The crystalline form of the element, on the other hand, is also only slightly soluble in water and caustic soda solutions in presence of inert gases, but in presence of air the solubility is greatly increased.—Note on a double chloride of molybdenum and potassium, by Prof. G. G. Henderson. A description of the method of formation and of the properties of this salt, the composition of which is represented by the formula $3KCl, MoCl_3, 2H_2O$, was given.—The action of benzamidine on olefinic- β -diketones, by Dr. S. Ruhemann.—Dissociation constants of trimethylenecarboxylic acids, by Messrs. W. A. Bone and C. H. G. Sprankling. A comparison of the values of these dissociation constants with those of the corresponding saturated open-chain acids shows that the formation of a closed ring increases the values of these constants.—The elimination of hydrogen bromide from bromo-*gem*-dimethylsuccinic acid and from bromotrimethylsuccinic anhydride, by Messrs. W. A. Bone and H. Henstock.

Mineralogical Society, November 17.—Dr. Hugo Müller, F.R.S., president, in the chair.—Mr. R. H. Solly gave a detailed description of various minerals from the Binnenthal, five of which had not been identified with existing species. These five minerals all contain lead, arsenic and sulphur, but sufficient material for complete analyses has not yet been obtained. Three of them are red transparent minerals having each one perfect cleavage and a similar vermilion streak, but differing crystallographically: one is apparently orthorhombic with (100), (110)= $39^{\circ} 16'$, (010), (011)= $52^{\circ} 57'$ and (001), (101)= $42^{\circ} 43'$; another is oblique with $\beta=78^{\circ} 46'$, (100), (101)= $42^{\circ} 22'$ and (010), (111)= $37^{\circ} 3'$; while the third has a zone at right angles to the perfect cleavage with angles of approximately 30° and 60° . The other two

minerals, which could not be identified with any of the other sulpharsenites of lead previously described by the author, are black with metallic lustre. One of these is oblique with $\beta=81^{\circ} 11'$, (100), (101)= $40^{\circ} 7'$, (010), (111)= $55^{\circ} 26'$; it has a perfect cleavage (100), and, like liveingite, exhibits no oblique striations on the planes in the zone [100, 001]. The other mineral is also oblique with $\beta=89^{\circ} 40'$, (100), (101)= $46^{\circ} 18'$, and (010), (111)= $59^{\circ} 56'$; it has a perfect cleavage (100), and, like rathite, exhibits numerous oblique striations on the planes in the zone [100, 001]. On fine brilliant crystals of sartorite recently obtained by the author he has been able to confirm the oblique symmetry which he had previously announced, and to determine accurately the elements, $\beta=88^{\circ} 31'$, (100) (101)= $54^{\circ} 45'$, (010) (111)= $69^{\circ} 52\frac{1}{2}'$. Amongst other specimens from the dolomite of the Lenggenbach in the Binnenthal, the author exhibited and described peculiar rounded crystals of galena resembling seligmannite, hyalophane crystals twinned according to the Carlsbad law and showing three new forms, a green mica which was determined to be anorthic, albite and biotite, minerals which have not yet been hitherto recorded from the locality, and barytes in green crystals. Of specimens from the Ofenhorn, the author exhibited some remarkably fine crystals of anatase, and crystals of laumontite, a mineral new to the locality.—Mr. L. J. Spencer described crystals of adamite from Chili which were remarkable for their strong pleochroism.—Mr. G. F. Herbert Smith discussed the prismatic method of determining indices of refraction. From observations of the angles of incidence and deviation the refractive index and direction of the wave-front in the crystalline medium could be found. By using pairs of faces in the same zone and different angles of incidence a series of refractive indices is obtained which, when plotted with the direction angle as ordinate, gives in general a double curve. Three of the critical values are the principal indices, the fourth corresponding to the direction parallel to the zone-axis. The angles of polarisation with respect to the zone-axis provide a means of discriminating between the doubtful values. A description was given of an inverted goniometer whereby observations could be made in media other than air.

Linnean Society, November 19.—Prof. S. H. Vines, F.R.S., president, in the chair.—The Rev. John Gerard, S.J., exhibited a fasciated rose sent by the Rev. J. Dobson, of St. Ignatius's College, St. Julian, Malta, with this note:—"A freak of a white climbing rose, in which eight or nine blossoms with their stalks have grown together."—The Rev. R. Ashington Bullen brought for exhibition an albino mole, from a farm near Bagshot; it was wholly of a light fawn colour, and no similar specimen had been seen for at least twenty years, though many moles had been trapped on the same farm.—Dr. M. T. Masters, F.R.S., gave an abstract of his paper, a general view of the genus *Pinus*. The author stated that the object of the paper was to discuss the nature and value of the characters made use of in discriminating the various species of *Pinus*, and to supply additional points of distinction derived from the anatomical structure of the leaf and other sources. The author has framed an analytical table of the species, which, although mainly artificial, may be of assistance hereafter in facilitating the determination of the species, and in arranging them in more natural groups. The two main divisions adopted are the thin-scaled pines or *Tenuisquamæ*, and the thick-scaled pines or *Crassisquamæ*, according to the relative thickness of the cone-scales. Further subdivisions are founded on various points of distinction.—Contributions to the embryology of the *Amentiferæ*, part ii., *Carpinus Betulus*, by Dr. Margaret Benson and Miss Elizabeth Sanday. More than 500 accurately orientated, stained and mounted series of sections were obtained through ovules containing the earlier stages in the development of the numerous embryo-sacs, until the segmentation of the definitive nucleus and of the egg occurred. Former observations (see part i. in *Trans. Linn. Soc.*, ser. 2, bot. iii. (1894), pp. 409-424) were confirmed and the following new facts obtained. The polar nuclei meet at the neck of the cæcum, descend together and ultimately fuse near its base. The pollen-tube enters the sac in their vicinity, and provides some means of exit for one male gamete, which seems to be emitted into the cæcum

and makes its way to the definitive nucleus. Meanwhile the other male gamete is carried up by the tube and emitted into the substance of the egg, with which it fuses after a short delay. A wall is now formed round the egg, and when a considerable amount of endosperm is present, segmentation of the egg commences.

Royal Microscopical Society, November 18.—Dr. Hy. Woodward, F.R.S., president, in the chair.—Dr. Ed. Horder exhibited and described a metal clinical case for blood film work, &c.—Mr. **Taverner** exhibited on the screen two photographs of the leg of a water-mite which he had taken through the separate tubes of a binocular microscope to demonstrate that the images were dissimilar and capable of producing a true stereoscopic effect; if they were alike, the apparent solidity of the object as seen through the binocular microscope would be only a mental effect. He also exhibited in a stereoscope enlarged prints of the pair of photographs, which clearly showed that a true stereoscopic effect was produced.—Prof. J. D. **Everett**, F.R.S., read a note on Lord Rayleigh's paper of 1896, one part of which he had found specially difficult, namely, that in which the transition is made from direct to oblique illumination of a grating under the microscope. He had recently found a more direct mode of deducing the results there established, and that was set forth in the present communication. Lord Rayleigh, to whom he had submitted the note, said that on a cursory examination the new method of deduction seemed to be correct. Prof. Everett then proceeded to explain his proof by diagrams and formulæ on the blackboard.—Mr. W. **Weeché** gave a *résumé* of his paper on the mouth parts of the Nemocera and their relation to the families in Diptera, illustrated by a number of drawings shown on the screen by the epidiascope, and mounted specimens exhibited under microscopes.

CAMBRIDGE.

Philosophical Society, November 23.—Dr. Hobson, vice-president, in the chair.—The horse in Iceland and the Færøes, by Mr. F. H. A. **Marshall** and Mr. Nelson **Annandale**.—Note on the proportion of the sexes in *Cardinus maenas*, by Mr. R. C. **Punnett**.—On the transmission of earthquake waves through the earth, by the Rev. O. **Fisher**.—The action of ultra-violet light on moist air, by Mr. J. H. **Vincent**.—Experiment to show that negative electricity is given off by a metal exposed to Röntgen rays, by Prof. **Thomson**, F.R.S. Dorn, as well as Curie and Sagnac, have in different ways shown that a metal exposed to Röntgen rays gives out kathode rays; this can be shown very simply by mounting a small gold-leaf electroscope on a quartz support in a vessel in which a very good vacuum can be produced; when the vessel is exhausted and the gold leaves exposed to Röntgen rays they diverge, and on testing they are found to have a charge of positive electricity. If before exposure to the rays the leaves are charged negatively, then when the rays are applied the leaves at first collapse and then diverge, while if the initial charge is positive the divergence of the leaves increases from the time of putting on the rays. In this way is obtained a very direct proof that the gold leaves when exposed to the rays acquire positive and lose negative electricity.

MANCHESTER.

Literary and Philosophical Society, November 3.—Prof. W. Boyd Dawkins, president, in the chair.—A collection of wind-worn pebbles of quartz and quartzite from an old raised beach near Waverley, North Island, New Zealand, together with photographs, was exhibited by the president. They have been cut by the sand driven by the wind into the characteristic *Dreikanter*, and might easily be mistaken for the work of the hand of man. The direction of the prevalent winds is shown by the amount of work done on each side or facet, the texture of the wind-worn being quite different from that of the wave-worn surfaces. The collection and photographs were made by Lady Constance **Knox** in 1900, and they will be given to the Manchester Museum, Owens College.—Mr. H. E. **Schmitz** gave an account of his experiments on the specific heats of metals at low temperatures. The author gave a summary of his determinations of the specific heats of various metals:—(1)

between the temperature of liquid air and the ordinary temperature; (2) between the ordinary temperature and the temperature of steam. For the former temperature range two methods were used. Of these the first was the method of mixtures. The second method is similar in principle to Joly's well-known method of steam condensation, but here the weight determined is that of a deposit of ice. The final results show a variation of specific heat considerable in all cases, but more marked for metals of low than for metals of high atomic weight. This is shown by the following ratios of specific heat for lower range to specific heat for higher range for various metals:—aluminium 0.79, nickel 0.77, cobalt 0.78, copper 0.85, zinc 0.90, silver 0.92, tin 0.90, thallium 0.92, lead 0.96.

PARIS.

Academy of Sciences, November 30.—M. Albert Gaudry in the chair.—On the scapular and pelvic fins of fishes, by M. Armand **Sabatier**.—Observations made at the island of Réunion on the eclipse of the moon of October 6, by MM. Edmond **Bordage** and A. **Garsault**. The observations were much hindered by clouds, only two good photographs being obtained, one being at the moment of greatest shadow.—The last sun-spot minimum, and remarks on the subject of the law of zones, by M. J. **Guillaume**. It is suggested that the distribution of sun-spots in latitude has not followed the law of zones, due to Spörer.—The problem of Cauchy relating to a particular class of surfaces, by M. W. **de Tannenberg**.—On the effective representation of certain discontinuous functions, as limits of continuous functions, by M. Émile **Borel**.—On a class of functional equations, by M. S. **Lattès**.—Articulations with a flexible plate, by M. A. **Mesnager**.—On the temperature of flame, by M. Ch. **Féry**. After a critical examination of the errors involved in the use of thermocouples, an alternative method is proposed in which no solid body is introduced into the flame. The measurement is made by the production of the reversal of a metallic line, by means of rays emitted by a solid body carried to any convenient temperature. The method is accurate to about 10° C., and has been applied to the determination of the temperatures of a Bunsen flame, an acetylene flame, alcohol, hydrogen, and oxyhydrogen blowpipe flames.—On some phenomena presented by mercury arcs, by M. **de Valbreuze**. Some of the peculiarities observed in starting the arc appear to indicate the existence of a superficial membrane on the mercury which opposes the passage of the current, especially in the cold.—On the suppression of magnetic hysteresis by the action of an oscillating magnetic field, by M. Ch. **Maurain**. Some recent experiments by M. Marconi and M. Tissot on a new receiver for wireless telegraphy have directed attention to the action of a rapidly varying magnetic field upon magnetisation produced under ordinary conditions. This action is attributed by M. Marconi to the suppression of the time lag, by M. Tissot to a modification of ordinary hysteresis with respect to the field. The quantitative experiments of the author agree with the latter of these hypotheses.—On the law of regular distribution of total magnetic force of the earth in France on January 1, 1896, by M. E. **Mathias**.—The magnetic anomaly of the Paris basin, by M. Th. **Moureaux**.—On the fusibility of mixtures of the sulphides of bismuth and silver, and of the sulphides of bismuth and antimony, by M. H. **Pélabon**. The fusibility curve of mixtures of bismuth and silver sulphides is a polygonal line presenting two minima and a maximum, the latter corresponding to a definite compound of the formula $\text{Ag}_2\text{S} \cdot 4\text{BiS}$.—Stimulating or paralysing influences acting upon manganese considered as a ferment, by M. A. **Trillat**. A study of the precise conditions under which the maximum oxidising effect is obtained from small quantities of manganese salts, acting as metallic ferments.—The systematic alkylation of arsenic, by M. V. **Auger**. An extension of Meyer's reaction; sodium methylarsenate is reduced by sulphurous acid to methylarsine oxide, and this is treated with methyl alcohol, soda, and the alkyl iodide.—The separation of iodine in the state of alkaline salt from bromides and chlorides by its transformation into iodic acid, and on the preparation of pure iodine, by MM. H. **Baubigny** and P. **Rivals**. The solution is oxidised in alkaline solution with potassium permanganate, the iodine

being thus converted into iodate, and after the addition of copper sulphate the bromine is distilled off in a current of air. On acidifying with sulphuric acid the chlorine can then be distilled off. Test analyses are given.—The microscopic study of the prehistoric bronzes of the Charente, by M. G. **Chesneau**.—On the eggs of *Bombyx Mori*, by M. Jules **Gal**.—On the egg production, fecundity, and sexuality in carnivorous fowls, by M. Frédéric **Houssay**.—On the infectious exophthalmia of certain fresh-water fishes, by M. J. **Audigé**.—Contribution to the cytological study of the Ascomycetes, by M. **Guilliermond**.—On the geological synthesis of the eastern Alps, by M. Pierre **Termier**.—On a remarkable case of spontaneous crystallisation of gypsum, by M. Stanislas **Meunier**.—Luminous sensation as a function of the time for coloured light: technique and results, by MM. André **Broca** and D. **Sulzer**.—On the prediction of the yield of the sources of the Vanne, by M. Edmond **Maillet**.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 10.

ROYAL SOCIETY, at 4.30.—On the Integrals of the Squares of Ellipsoidal Surface Harmonic Functions: Prof. G. H. Darwin, F.R.S.—Preliminary Note on the Resistance to Heat of *B. Anthracis*: A. Mallock, F.R.S., and Lieut.-Col. A. M. Davis.

MATHEMATICAL SOCIETY, at 5.30.—Proof of a Formula in Elliptic Functions: Mr. R. J. Dallas.—On Many-valued Newtonian Potentials: Prof. A. C. Dixon.—A Generalisation of Neumann's Expansion of an Arbitrary Function in a Series of Bessel's Functions: Rev. F. H. Jackson.—Modes of Convergence of Infinite Series of Functions of a Real Variable: Dr. E. W. Hobson.—On Normal and Antinormal Piling: Prof. J. D. Everett.—On the Distribution of the Points of Uniform Convergence of a Series of Functions: Mr. W. H. Young.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Presentation to representatives of the Borough of Colchester of a historical picture representing Dr. Gilbert in the act of showing his electrical experiments to Queen Elizabeth and her Court.—The Slow Registration of Rapid Phenomena by Sirographic Methods: the "Ondographe" and "Puissancegraphe" (Wave Recorder and Power Recorder): M. E. Hospitalier.—The Magnetic Dispersion in Induction Motors, and its Influence on the Design of these Machines: Dr. Hans Behn-Eschenburg.

SOCIETY OF ARTS, at 4.30.—India's Place in an Imperial Federation: J. M. Maclean.

FRIDAY, DECEMBER 11.

PHYSICAL SOCIETY, at 8.—A Method of Mechanically Reinforcing Sounds: Rev. T. C. Porter.—The Simmance-Abady "Flicker" Photometer: Messrs. Simmance and Abady.—Exhibition of a Conductometer: R. Appleyard.—A Model to illustrate various Properties of Wave-motion: Prof. L. R. Wilberforce.

ROYAL ASTRONOMICAL SOCIETY, at 5.—The Rotation Period of the Planet Saturn: W. F. Denning.—The Shower of Leonids in 1903: G. W. Hough.—*Probable Papers*: Two Drawings of the Mare Serenitatis by John Russell, R.A., affording some hitherto Unpublished Evidence as to the appearance of Linné in the Year 1788: A. A. Rambaut.—On Graphical Methods of finding the Time of Sunset at any Place: H. H. Turner.—On Oscillating Satellites; Second Paper: H. C. Plummer.—An Examination of the Relative Star Density in different Parts of the Plates forming the Harvard Photographic Star Map: J. C. W. Herschel.

MALACOLOGICAL SOCIETY, at 8.—On *Pleurotaulatus pulcher*, sp. nov.: G. C. Crick.—Description of a New Species of Cassis: E. A. Smith.—On the Mollusca procured during the *Porcupine* Expedition 1869-1870, Supplemental Notes, Part I.: E. R. Sykes.—Notes on the Nervous System of Pelecypoda: R. H. Burne.

MONDAY, DECEMBER 14.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—The Patagonian Andes: Col. Sir T. H. Holdich, K.C.M.G., K.C.I.E.

VICTORIA INSTITUTE, at 4.30.—The Genesis of Nature: Rev G. F. Whidborne.

SOCIETY OF ARTS, at 8.—The Mining of Non-Metallic Elements: Bennett H. Brough. (Cantor Lectures. IV.)

TUESDAY, DECEMBER 15.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Deposits in Pipes and other Channels conveying Potable Water: Prof. J. Campbell Brown.—The Purification of Water Highly Charged with Vegetable Matter; with Special Reference to the Effect of Aeration: Osbert Chadwick, C.M.G., and Bertram Blount.

SOCIETY OF ARTS, at 8.—The British Silk Industry: Frank Warner.

ROYAL STATISTICAL SOCIETY, at 5.—The Metrical System of Weights and Measures: Alex. Siemens.

WEDNESDAY, DECEMBER 16.

CHEMICAL SOCIETY, at 5.30.—On the Relative Strengths of the Fixed Bases and of Ammonia as Measured by their Action on Cotinine: J. J. Dobbie, A. Lauder and C. K. Tinkler.—New Halogen Derivatives of Diphenyl and Dihydroxy-diphenyl: J. C. Cain.—(1) Constitution of Nitric Peroxide; (2) Sabatier's Nitroso-disulphonic Acid: E. Divers.—Notes on some Natural Colouring Matters: A. G. Perkin and E. Phipps.—The Estimation of Methyl Alcohol in Presence of Ethyl Alcohol: T. E. Thorpe and J. Holmes.

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ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Some Account of the Meteorological Work of the late James Glaisher, F.R.S.: William Marriott.—On certain Relationships between the Diurnal Curves of Barometric Pressure and Vapour Tension at Kimberley, South Africa: J. R. Sutton.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On the Structure and Affinities of the Genus Porosphaera: Dr. George J. Hinde, F.R.S.—Exhibition Slides illustrating the Development of an Ascidian: F. W. Watson Baker.

GEOLOGICAL SOCIETY, at 8.—The Igneous Rocks Associated with the Carboniferous Limestone of the Bristol District: Prof. C. Lloyd Morgan, F.R.S., and Prof. S. H. Reynolds.—The Rhætic Beds of England: A. Rendle Short.

SOCIETY OF ARTS, at 8.—The Science of Taxation and Business: Sir William H. Preece, K.C.B. F.R.S.

THURSDAY, DECEMBER 17.

LINNEAN SOCIETY, at 8.—On the Docoglossa; a Study in Evolution H. J. Fleure.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.

FRIDAY, DECEMBER 18.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—An Inquiry into the Working of various Water-Softeners: C. E. Stromeyer and W. B. Baron.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Action of the Sea upon the Foreshore: C. B. Case.—The Causes of the Loss of Beaches: F. W. Cable.

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